Observations from a Clinical Workstation Implementation

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INTRODUCTION

The Texas Children's Cancer Center (TCCC) at Texas Children's Hospital (TCH) is one of the nation's largest pediatric hematology/oncology clinics. The clinic provides in excess of 10,000 patient encounters per year with 15 attending physicians, 10 physician fellows, 6 nurse practitioners, 6 clinic nurses, and 4 social workers. A recent project to expand clinic operations led to the in-house design, development, and implementation of a Clinical Workstation (CWS) application for electronic charting in an outpatient setting.

The goals for this project were to (1) improve patient care by making patient charts multidisciplinary and accessible throughout the clinic, hospital, and from physician and other care provider offices, (2) increase clinic efficiency by automating key processes within the clinic, (3) assist the hospital in identifying requirements for a hospital-wide electronic medical record, and (4) provide a pool of data for research projects.

The system was installed in the clinic on 12/6/94 with all active oncology patients on-line as of 3/27/95. The project implementation was sucessful with good user acceptance and project goals achieved.

TECHNICAL DESCRIPTION

The system architecture is client/server. Powersoft's PowerBuilder Enterprise Edition was utilized to develop the Microsoft Windows-based client application. A DEC AlphaAXP 150 server configured with 64 Mb ram, Microsoft Windows/NT, and SQL Server functions as the database engine. Client computers are a mixture 486/50, 486/66, and Pentium P5-75 machines configured with Microsoft Windows for Workgroups 3.11, 8-16 Mb ram, and 14-17 inch displays. The networking environment is 10Base-T.

DESIGN SUMMARY

Both the underlying database and user interface were designed to support a longitudinal, encounter-based medical record. Information entered is related to, and grouped by, one of four types of encounters: outpatient, telephone, inpatient, and review. Within each encounter any number of entries can be charted depending upon the type of encounter and established practice guidelines. The types of entries that can be made include: current medications, physical exams, vital signs, detailed patient histories, laboratory results, diagnostic procedure results, problem assessments, treatment plans, nursing assessments, and admission notes. The system also maintains and forces the use of a problem list with each problem either in an active or resolved state with any number of assessments made over time. Other data maintained by the system includes allergies, orders, patient contacts, patient referring, treating, and consulting physicians, treatment protocols, and patient education.

UTILIZATION (12/6/94 - 4/20/95)

Total number of patients on-line: 425; Total number of encounters: 2387; Average encounters per day: 25 (51 since 3/27); Total number of patient problem assessments: 1611; Average size of a problem assessment: 36 words; Total number of nursing assessments: 657; Average size of a nursing assessment: 68 words; Database Size: 90 Mb; Database growth: 10 Mb/week since 3/27.

OBSERVATIONS

(1) User acceptance has been better than expected from all levels of staff, including physicians, due to the ease of use of the Windows interface.

(2) Training time is minimal. Training is conducted one-on-one in a single 20-30 minute session.

(3) There is a general willingness by clinicians to type entries. The standard windows editing and cutting and pasting capabilities help make up for slower typing skills.

(4) The adoption of a problem-oriented record has improved patient care and facilitated the longitudinal tracking of complex medical problems.

(5) Entries made into the computer are more complete and legible.

(6) The computer forces a common, consistent methodology for documentation and helps with teaching physician fellows and nurse practitioners.

(7) The time to admit a patient has been reduced 1/2 hour by eliminating the duplicate step of entering data into the chart and on an admission note.

(8) The accessibility of patient data outside the clinic has led to better, more efficient care by providing access to data from various locations including physician offices and remotely via a modem. Telephone calls can be handled with the entire medical record available to the clinician.

(9) Electronic data is now available for research purposes.

(10) The hardware requirements for client computers is greater than originally anticipated. User acceptance increased with Pentium-based computers.

(11) The level of support during the early stages of implementation is significant and directly affects user acceptance.

(12) The balance between structured entries and free-text entries in the design is well accepted.